

VISWAJYOTHI COLLEGE OF ENGINEERING AND TECHNOLOGY (Autonomous)
FIRST SEMESTER B.TECH DEGREE EXAMINATION DECEMBER 2025 (2025 SCHEME)

Course Code: 25VJGAPHT121

Course Name: PHYSICS FOR INFORMATION SCIENCE

Max. Marks: 60

Duration: 2 Hours 30 Minutes

PART A

<i>Q.No.</i>	<i>Answer all questions. Each question carries 3 marks</i>	<i>CO</i>	<i>Marks</i>
1	Define Fermi Dirac Distribution.	CO1	(3)
2	Define energy band, valence band and conduction band.	CO1	(3)
3	Formulate Schrodinger's time dependent equation by using de Broglie's formula and Einstein's relation for photon energy.	CO2	(3)
4	A well- behaved wavefunction is normalised. Why?	CO2	(3)
5	Compare intrinsic and extrinsic semiconductors	CO3	(3)
6	Draw V-I characteristics of pn junction	CO3	(3)
7	Define ripple factor of rectifier. What does a small value of ripple factor means?	CO4	(3)
8	Draw V-I characteristics of LED. Give the relationship of wavelength of light emitted by LED and energy gap.	CO4	(3)

PART B

Answer any one full question from each module. Each question carries 9 marks

Module 1

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| 9 | a) Discuss BCS theory of superconductivity. (6 marks) | CO1 | (9) |
| | b) Mention any six applications of superconductors. (3 marks) | | |
| 10 | a) Explain Meissner effect and show that superconductors are perfect diamagnets. (5 marks) | CO1 | (9) |
| | b) Define critical field and critical temperature. Write a relation connecting them. (4 marks) | | |

Module 2

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| 11 | Write the differential equation of a particle in a one dimensional box and obtain the normalised wavefunction and possible energy values. | CO2 | (9) |
| 12 | What is Uncertainty principle? Explain the uncertainty in the frequency of light emitted by an atom and absence of electron in the nucleus using uncertainty principle. | CO2 | (9) |

Module 3

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| 13 | a) Using the equations for density of electrons in conduction band and density of holes in valence band, derive an expressions for carrier concentration in intrinsic semiconductors. Explain the variation of intrinsic carrier concentration with temperature. (6marks) | CO3 | (9) |
| | b) List characteristics of extrinsic semiconductors. (3marks) | | |

- 14 a) Prove that the location of fermi level in an intrinsic semiconductor at 0K lies at the middle of valence and conduction bands. (6marks) CO3 (9)
b) Draw energy band diagram of p-type semiconductor showing its fermi level. (3marks)

Module 4

- 15 a) Explain the construction and working of zener diode. (6marks) CO4 (9)
b) Differentiate zener breakdown and avalanche breakdown. (3marks)
- 16 a) Explain the construction and working of a solar cell with a neat diagram. (6 marks) CO4 (9)
b) Draw the I-V characteristics of a solar cell and explain the terms efficiency and fill factor. (3marks)
